

I. Simplify - No calculator

1. $3 \begin{bmatrix} 2 & 3 \\ -5 & 0 \end{bmatrix} - \begin{bmatrix} 8 & 2 \\ -3 & -5 \end{bmatrix}$

$$\begin{bmatrix} 6 & 9 \\ -15 & 0 \end{bmatrix} - \begin{bmatrix} 8 & 2 \\ -3 & -5 \end{bmatrix} = \begin{bmatrix} -2 & 7 \\ -12 & 5 \end{bmatrix}$$

2. $\begin{bmatrix} 3 & -2 \end{bmatrix} \begin{bmatrix} 5 & 0 & 2 \\ 1 & -3 & x \end{bmatrix}$

$$\begin{bmatrix} 13 & 6 & 6-2x \end{bmatrix}$$

3. $\begin{bmatrix} 5 & x \\ 0 & -3 \end{bmatrix} \begin{bmatrix} 2 & -3 \\ 4 & 1 \end{bmatrix}$

$$\begin{bmatrix} 10+4x & -15+x \\ -12 & -3 \end{bmatrix}$$

II. Find the determinant. Show work - no calculator.

4. $\begin{bmatrix} -8 & 2 \\ 3 & 5 \end{bmatrix}$

$$-40 - 6$$

$$\boxed{-46}$$

5. $\begin{bmatrix} 7 & 5 & x \\ 2 & 0 & 4 \\ -3 & 1 & 2 \end{bmatrix}$

$$(0 + (-60) + 2x) - (0 + 28 + 20)$$

$$-60 + 2x - 48 = \boxed{2x - 108}$$

III. Write the matrix equation that represents each system, and solve the system, if possible, by using a matrix equation.

6. $3x - 2y = 8$
 $4x - 3y = 10$

$$\begin{bmatrix} 3 & -2 \\ 4 & -3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 8 \\ 10 \end{bmatrix}$$

$$\boxed{x = 4}$$

$$\boxed{y = 2}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 & -2 \\ 4 & -3 \end{bmatrix}^{-1} \begin{bmatrix} 8 \\ 10 \end{bmatrix}$$

7. $3x + y + z = 5$
 $2x - y + z = 6$
 $y - 2z = 2$

$$\textcircled{1} \begin{bmatrix} 3 & 1 & 1 \\ 2 & -1 & 1 \\ 0 & 1 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ 6 \\ 2 \end{bmatrix}$$

$$\textcircled{2} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 & 1 & 1 \\ 2 & -1 & 1 \\ 0 & 1 & -2 \end{bmatrix}^{-1} \begin{bmatrix} 5 \\ 6 \\ 2 \end{bmatrix}$$

$$\boxed{x = 3}$$

$$\boxed{y = -2}$$

$$\boxed{z = -2}$$

8. $8x + y - z = 0$
 $5x + 2y - 9z = -3$
 $12x + y + 5z = 8$

$$\textcircled{1} \begin{bmatrix} 8 & 1 & -1 \\ 5 & 2 & -9 \\ 12 & 1 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ -3 \\ 8 \end{bmatrix}$$

$$\textcircled{2} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 & 1 & -1 \\ 5 & 2 & -9 \\ 12 & 1 & 5 \end{bmatrix}^{-1} \begin{bmatrix} 0 \\ -3 \\ 8 \end{bmatrix}$$

$$\boxed{x = -1}$$

$$\boxed{y = 10}$$

$$\boxed{z = 2}$$

~~X~~ Solve using Cramer's Rule. (exact answer)

~~X~~ $8x + y = 7$
 $5x + 3y = 2$

~~X~~ $4x - 2y = 10$
 $3x - 5y = 11$